

cellular layers and forming veins within the cup or cavity formed by the peripodal membrane. To assume its normal definitive position in the imago it is only necessary that it be thrust out through the narrow opening, the mouth of the original invagination of the skin hypoderm. This evagination or shifting from apparently inside the body to outside occurs at the time of pupation, the wing thereafter lying folded on the ventral thoracic aspect of the pupa.

#### References.

Students undertaking the study of the development of the histoblasts will need to refer to detailed accounts of such development as studied and described by reputable entomologists (and zoologists). For an introduction to, or general abstract of our knowledge of this subject (up to 1897) see "The Imaginal Discs of Insects," by H. S. Pratt, *PSYCHE*, Feb. 1897, vol. 8, no. 250; for a detailed account of the development of the wing discs of a particular insect species see "The Development of the Wings in the Lepidoptera" by W. F. Mercer, *Jour. N. Y. Ent. Soc.*, March 1900, vol. 8, no. 1. For further

references see the bibliography given in these two papers.

#### Histoblasts Showing Externally.

The integument of the larva of *Holobrusia* is too opaque to permit the buds to be visible from the outside of the body, and this is the case with most larvae. But in some the thoracic buds may be readily seen from the outside, and the gross details of their development followed by simple examination of the exterior of the larvae. This is true for example of the larvae of *Chironomus* (fig. 1, B) and especially of *Simulium* (fig. 1, A). The position and gross appearance of the thoracic buds in *Simulium* can be seen in young larvae and the growth and the foldings and convolutions of the hypodermal layer followed by examination of successively older larvae. As the larvae of both *Simulium* and *Chironomus* are common all over the country, (*Chironomus* in ponds and still pools of streams, and *Simulium* in clear swift water in dense patches on submerged rocks) some acquaintance at least with imaginal buds can be made without either dissection or sectioning.

### LIFE HISTORIES OF NORTH AMERICAN GEOMETRIDAE.—XXV.

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*Cingilia catenaria* Cram. The mature larva has been described by Harris, Packard, Coquillett and Scudder.

*Eggs.* Laid loosely and falling to the ground. Elliptical, gently flattened on two sides, one end distinctly and sharply trun-

cate, making the egg not much longer than wide; the other end slightly depressed, rounded; truncate end slightly concave. Smooth, uniformly and rather finely reticulate, the reticulations irregularly hexagonal, slightly raised, subgranular, the areas flat. Truncate end only faintly reticulate, the margin a smooth rim, a dark spot at the micropyle. Pale yellowish green, soon turning sordid lilac and darkening still further before hatching. Size  $1.8 \times .7 \times .5$  mm. The eggs lie on the ground over winter.

*Stage I.* Head rounded, not bilobed, smooth, wider than high, clypeus moderate; blackish, paler and brownish on the face; width about .3 mm. Body normal, cylindrical, segments submoniliform; rather short, feet normal. Joint 2 whitish, the rest with broad dorsal, narrower but still broad subdorsal and very broad ventral dark brown bands. Tubercles elevated; setae short, dark, with slightly enlarged tips. Segments obscurely, rather numerous annulate. Shields, plates and tubercles blackish. The larva pales with growth, the dorsal band becomes paler than the subdorsal one and grayish, all faintly green tinted. The dark transverse cervical shield looks detached in the white area of joint 2.

*Stage II.* Head about .6 mm., erect, rounded, moderately bilobed, the lobes full; clypeus rather high; pale yellow, shining, a gray patch at the vertex of each lobe; mouth brown, the large ocelli black. Body normal, moderate; tubercles elevated, rather large but concolorous; setae short, dark. Shields all membranous, concolorous. A narrow black subdorsal line, absent on the shields; two quadrate lateral black patches per segment, obscurely joined by obsolete brownish lateral and stigmatal lines; a narrow brown subventral line, bimaculate with blackish segmentarily. Obscure geminate, submaculate, brownish ventral line. Feet dusky shaded.

*Stage III.* Head rounded, pale yellow with circular black spots on the epicranial setae, over eyes, a line on back of occiput and patches at apex of paraclypeus, clypeus

and epistoma; antennae short, labrum moderate; width 1 mm. Body pale yellow, cervical shield and anal plate with four black spots; leg shield and sides of joint 2 also spotted. Subdorsal line fine, black, not cutting the shields; lateral and stigmatal lines brown, broken at the spiracles, joined by bisegmental black patches; traces of a line just below subventral fold; subventral line black submaculate; adventral line double, brownish. Spiracles black in whitish areas. Segments annulate, not shining.

*Stage IV.* Head slightly bilobed, the lobes full laterally, clypeus large, not high, triangular, the sutures not deep but distinct, paraclypeal sutures faint; light yellow with four round black spots outwardly on each lobe, a spot over ocelli and some smaller brownish ones on clypeus; labrum white; width 1.7 mm. Thoracic feet close together, abdominal ones on joints 12 and 13. Body light yellow, segments about 12-annulate, but somewhat irregularly; very narrow deep brown longitudinal lines, the subdorsal distinct, lateral suprastigmatal and stigmatal faint, the two latter connected before and behind each spiracle by a conspicuous black patch; spiracle surrounded by a white patch subventral line just below the subventral ridge faint; a pedal line submaculate in black; two ventral lines on each side, rather distinct. Abdominal feet with brown black spots similar to those on the head. Thoracic feet less distinctly marked with brown.

*Stage V.* As in the penultimate stage; width of head 2.4 mm. See description of this stage by Scudder (PSYCHE, VI, 124, 1891).

*Cocoon* an open net of yellow silk spun among leaves.

*Pupa* as described by Scudder.

Larvae from Woods Holl, Mass., and Bellport, N. Y. Eggs were sent me from Nonquitt, Mass., by Miss C. G. Soule. The eggs are laid in September and hatch the following spring. Larval stages passed slowly.

*Food plant*, Bayberry (*Myrica cerifera*).